

THE MINERAL INDUSTRY OF

ZAIRE

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In 1996, the mining industry of Zaire continued to stagnate. Historically, the mining industry accounted for 25% of Zaire's gross domestic product and about three-quarters of total export revenues. However, the near collapse of the economy has made it difficult to sustain normal mining activities. The outbreak of fighting late in the year in eastern Zaire between Army troops and Tutsi rebels put further pressure on the Government and the economy, already burdened with half a million refugees fleeing the civil wars in Rwanda and Burundi. The state-owned La Generale des Carrieres et des Mines du Zaire (Gecamines), formerly the nation's major foreign currency export earner, continued to struggle to maintain copper production at only 5% of capacity. A program begun in 1994 to focus on high unit value cobalt production gave some returns as cobalt mine production increased 19% in 1996 and refined cobalt increased by over 20% in 1996 from 1995 levels.

The deterioration of the overall economy of Zaire and the lack of reinvestment of Gecamines revenues in routine maintenance and capital development have contributed to this decline in the industrial mainstay of the economy. With the virtual collapse of Zaire's metal mining sector, diamond exports, chiefly from the Kasai Provinces, became Zaire's most important source of foreign exchange derived from the mineral sector. Hyperinflation and the further disintegration of the economy continued in 1996 as the internal economies of the key mining Provinces of Kivu and Kasai, and Shaba operated almost independently of support from the central Government. The national economy was also adversely affected by the massive influx of Rwandan refugees into the country near Goma that affected the northeast region's gold and columbium (niobium) production.

Legislation existed relating to all aspects of the mineral industry. Article 10 of the Constitution stated that the soil and subsoil belong to the state. Prospecting, exploration, and exploitation were regulated by Ordinance No. 81-013 of April 2, 1981, and required permits from the Ministry of Mines and Energy.

The Zairian Government through the Ministry of Mines, which controls most of the mining enterprises, had set in motion, at the encouragement of the World Bank, efforts to privatize the mining sector and to attract new foreign investment through joint ventures with Gecamines. Targets for privatization or joint-venture redevelopment were the more than 20 copper-cobalt and zinc mines and processing facilities owned by Gecamines, the gold-tin producer Societe Miniere et Industrielle du Kivu (SOMINKI), the major diamond producer Societe Miniere de Bakwanga (MIBA), and the major gold producer

Office des Mines d'Or de Kilo-Moto (Okimo).

Gecamines faced multiple crises in finance, production, and transportation. The company's poor condition was attributed to a combination of aging equipment; lack of domestic and international investment; lack of spare parts; fuel, lubricants, and sulfuric acid shortages; ore and finished product transportation problems; theft of finished products; debts owed to the state electricity company and state railway company; flooding of open pit mines; and the inability to retain professional and other personnel because of disruptions caused by tribal conflicts and other factors.

Gold production declined an estimated 18% while diamond production by MIBA and artisanal miners continued to thrive but reportedly as much as one-third or 6 to 7 million carats of national output was smuggled out of the country (Mining Journal, 1996). (See table 1.)

The more significant mineral commodities exported from Zaire were cobalt, copper, diamond, gold, and crude oil, of which 5.5 million barrels went to the United States. Zaire's main trading partners were Belgium, France, Germany, Japan, South Africa, and the United States. Imports by the United States from Zaire consisted mainly of refined copper cathode, gem diamond, and crude oil.

Zaire's Government maintained at least part ownership, and generally majority ownership, of nearly all the productive and service sectors of the economy. Gecamines, the principal parastatal company, produced essentially all of Zaire's copper, cobalt, and coal. Gecamines also operated subsidiaries that produced cement and other materials required for its primary mineral interests. MIBA, which is 80% owned by the Government produced about 25% of industrial diamond production with the remainder coming from small artisanal operators. Sominki and Okimo were the other principal parastatal mining companies.

Under Gecamines survival plan, cobalt became the company's primary foreign currency earner. Zaire's total cobalt metal production continued to recover from an estimated level of 3,300 metric tons (t) in 1994 to approximately 3,990 t in 1995, of which 546 t were semifinished white alloy and matte.

In 1995, Gecamines reported completion of an investment of \$130 million to put in a 20-million-cubic-meter-per-year, 15-kilometer (km) conveyor belt extraction system at the Kamoto Oliveira Virgure (KOV) open pit mine at Kolwezi. Union Miniere (UM) of Belgium entered a joint venture with Gecamines to rehabilitate the Kasombo cobalt mine and upgrade hydrometallurgical process at the Shituru cobalt plant near Likasi. Mine production began in September 1996 with 1,000

t of cobalt produced in the last quarter. The cobalt plant was expected to be operational in early 1997, increasing cobalt recoveries by several hundred tons per year. In 1996, UM Cobalt and Energy products also acquired 28,000 t of stockpiled low grade cobalt hydrates containing some 1,000 t of cobalt for export.

In late 1995, Gecamines awarded a \$41-million contract to JCI Ltd. of South Africa to upgrade mining equipment and metallurgical facilities. Indications were that Gecamines was making a concerted effort to begin to restore copper production capabilities through modest new investment and through new efforts to seek joint-venture foreign investment participation. Despite the perceived high political risk, the known high grade copper-cobalt resources and basic in-place mining infrastructure began to attract some international mining companies.

In November 1996, the Canadian company, Consolidated Eurocan Ventures Ltd., a subsidiary of Lundin Holdings Ltd. of Bermuda, acquired from Gecamines a 55% interest in the Tenke-Fungurume copper deposits. Gecamines will retain a 45% equity interest and receive compensation payments from Consolidated Eurocan Ventures Ltd. of \$50 million by December 1996; \$40 million "when Consolidated Eurocan elects to place project into production;" and a final payment of \$160 million by December 2002. Geological resources, dating back to when efforts were made to develop the property in the 1970's, were reported by the company at 222 million metric tons (Mt) at 4.42% copper and 0.33% cobalt of which proven reserves equal 92.6 Mt of 4.59% copper and 0.36% cobalt. To put the high copper ore grade of the Tenke-Fungurume deposits, and the low unit cost potential of this project, in perspective it is over 8 times richer than the average grade of copper ore mined in the United States of 0.57%. A \$12 million feasibility study was scheduled to begin in April 1997. (Consolidated Eurocan Ventures, 1996a,b; Metal Bulletin, 1996b, 1997; Randol International, 1996). In January 1997, Consolidated Eurocan Ventures changed its corporate name to Tenke Mining Corp.

The junior exploration company, International Panorama Resources Corp. of Canada acquired a 51% working interest from Gecamines in August 1996 to reprocess copper-cobalt tailings from the Kambove and Kakanda Mines. Gecamines also was to receive 1.5% net profits royalty after the capital payback period. Estimated resources in the tailings were 61 Mt averaging 0.98% copper and 0.19% cobalt. International Panorama Resources estimates 85% of resource will be recoverable over a 10 to 13 year project life. A feasibility study is to be conducted in 1997. Preliminary capital development costs were projected at \$190 million, with production startup projected for mid-1999 (International Panorama Resources, 1996a,b,c).

Anvil Mining of Australia completed negotiations in September with the Government of Zaire on the terms of a mining convention in which Anvil would acquire a 90% interest in the Dikulushi copper-silver project in southeastern Zaire near the Zambia border west of Pweto and Lac Moero. Anvil reported a measured and indicated resource at Dikulushi of 1.66 Mt grading 11% copper and 310 grams per metric ton (g/t)

silver. The mining convention was signed in January 1997 (Anvil Mining, 1997).

In January 1996, Banro Resource Corp. of Canada, through its wholly owned subsidiary, African Mineral Resources Inc., in conjunction with its joint-venture partner, Mines d'Or du Zaire (MDDZ) purchased a 64% interest in SOMINKI for \$3.5 million. Banro and MDDZ jointly controlled 72% of the gold, tin, tantalum mines and land of SOMINKI with the balance retained by the Government. The company owns 10 mining permits and 47 mining concessions covering 10,271 square kilometers. Included in the gold holdings southwest of Bukavu in Kivu Province are the producing Kamituga/Mobale underground gold mines which Banro estimates, based on past work by SOMINKI, to contain resources of 124,414 kilograms (kg) of contained gold; the Twangiza property containing proven and probable open pit oxide reserves of 5.5 Mt grading 4.3 g/t, with possible minable sulfide reserves of 2.7 Mt containing 4,600 kg of gold; the Lugushwa property containing resources on two of its areas of 3 Mt of 4.5 g/t and 2.5 Mt of 4 g/t respectively; and the former Namoya Mine with reported mineable sulfide reserves estimated at over 9,330 kg of contained gold. In January 1997, Banro signed a new mining convention with the Government increasing Banro's interest in SOMINKI to 93% with the Government retaining a 7% carried interest. At the same time, all assets of SOMINKI were transferred into a new company, SAKIMA SARL. Banro agreed to invest \$15 million and received a 10 year-post production tax moratorium, an elimination of import duties, and the right to export all gold production (Banro Resource Corp, 1996, 1997).

In August 1996, the Barrick Gold Corp. of Canada signed a mining convention with the Government to explore and operate the former state-owned Okimo gold mines in the Bunia area in northeast Zaire (Africa Energy & Mining, 1996).

The Kisenge Manganese Company has not done any mining since the late 1970's when the civil war in Angola closed the Benguela railroad, Kisenge's principal export route. At that time, an estimated 1 Mt of manganese ore was stockpiled at the mine site. Some ore has been shipped internally to supply a dry cell battery plant, but it is believed that most of the stocks remain. In October 1995, Kisenge signed a contract with the Benatar Group of South Africa to ship an initial amount of 10,000 to 15,000 t, most likely via the Tazara Railroad to the port at Dar es Salaam, Tanzania. A further shipment of 100,000 t was also discussed that would provide Kisenge with the capital to upgrade its battery plant (Yenga, 1996).

American Mineral Fields Inc. (AMF), a company headquartered in the United States and listed on the Vancouver Stock Exchange, signed a framework agreement with Gecamines effective August 20, 1996, to procure a feasibility study on the Kipushi zinc mine and related facilities. AMF can only acquire an equity interest if a successful feasibility study leads to another agreement with Gecamines to rehabilitate the mine and smelter which closed in 1993. AMF also entered a 50-50 joint venture with the Anglo American Corp. of South Africa on May 8, 1996 to conduct the Kipushi feasibility study (Financial Times, 1996). Preliminary estimates by AMF projected a cost of \$30 million to renovate mine and mill. A

feasibility study on building a smelter to produce 200,000 metric tons per year (t/yr) of zinc; 30,000 t/yr of copper; and 400,000 t/yr sulfuric acid was underway. Capital costs for the smelter were projected around \$350 million. An AMF consultant, Watts, Griffis and McOuat of Canada confirmed Gecamines estimates of remaining measured resources at 9.9 Mt at 2.51% copper, 0.47% lead, and 9.96% zinc. Combined measured and indicated mineral resources are 20.6 Mt at 2.27% copper, 0.47% lead, and 15.18% zinc. Mined and probable reserves, after 10% dilution, were given as 22.6 Mt at 2.06% copper, and 13.81% zinc. An addition indicated mineral resource of approximately 16 million cubic meters of Kipushi tailings grades an average 0.36% copper, 1.62% lead, and 2.25% zinc (American Mineral Fields, 1996; Metal Bulletin, 1996a).

MIBA was the major official diamond producer in Zaire, accounting for about 40% of official Zairian diamond exports. MIBA is owned 80% by the Government and 20% by the Belgium company Sibeka, in which De Beers has a minority interest. De Beers purchases all of MIBA's industrial diamond output under an exclusive contract. In 1996, MIBA mined 4.2 MT of ore in 1996 and with the help of new crushing, washing and sorting plant recovered 5.5 million carats with an average value of \$12 per carat (World Diamond Industry Directory & Yearbook, 1997/1998). In 1996, in addition to MIBA, 11 official diamond buyers and exporters (comptoirs) exported an estimated 1 million carats per month valued at approximately \$30 million. The Government's Centre National d'Expertise estimated that more than one-third of Zaire's diamond production worth about \$300 million is smuggled out each year (Mulenga, 1997; Mining Journal, 1996). Three Canadian companies, South Atlantic Diamonds, Taylor Rand, and White Swan Resources Inc. were actively exploring for diamonds in the Kasai Provinces during the year. The flight of rebel Unita troops across the Angola/Zaire border into diamond producing areas in Kasai was also disruptive to artisanal mining activities.

Coal production from the Luena Mine was significantly reduced as a result of ethnic conflicts in Shaba and the reduced demand from Gecamines' plants.

Zaire Gulf Co., which is controlled by Chevron (United States-50%), Teikoku Oil (Japan-32.3%), and Unocal (United States-17.7%) produced approximately 75% of the nation's petroleum from its 35 offshore wells.

Zaire's major mineral resources were generally considered sufficient for many years of production, with known copper ore grades running two to eight times the grade of typical copper ore mined in North America and South America. However, reserve data on copper, cobalt, gold, and zinc have not been updated for several years and must be reevaluated in light of current economic conditions in Zaire and in light of the deterioration of Gecamines and other facilities. Reserves of oil and gas at yearend 1995 were 187 million barrels of oil and 1.4 billion cubic meters of natural gas (International Petroleum Encyclopedia, 1996).

Zaire is an essentially landlocked country, with only a small coastal area on the Atlantic Ocean. The 2-million-metric-ton-per-year Port of Matadi suffered from abysmal road access to

the interior, endemic looting, and an 160-km river approach to the seaport and has been subject to periodic Angolan rebel attacks (Journal of Commerce, 1994). Water falls make the Congo River unnavigable below Kinshasa and limit the world's second largest river as a significant export route.

Zaire utilized a combination of railroad, road, and river boat transport to move equipment, food, and other supplies into the mining and mineral processing regions and to convey out ores, concentrates, and finished mineral products. Much of this transport network was in varying degrees of disrepair. Locomotive and rolling stock shortages continued to limit the availability of ore at the mills, as well as limiting the quantity of finished products available for export. The Sizarail line was a critical logistical support link for the diamond industry between the Zambian border and Mubuji-Maya.

The major companies involved in transportation are Government owned. Small private trucking and river boat companies provided limited local service. Mineral products were shipped at times from the Copperbelt west on the Voie Nationale, a difficult road-rail-water route, to the Matadi seaport, the only transport route entirely within Zaire; through Zambia on the Tazara railroad to the Port of Dar es Salaam in Tanzania; as well as through Zambia to southern rail lines leading to bulk loading export ports in South Africa. Copper shipments could take 45 days to get from the plant to the dock, either south via Zambia and Zimbabwe or eastward along the Tazara railway. Owing to rail and river transport problems, most cobalt and copper wirebar products were shipped via truck convoy to the Port of Durban in South Africa. High-value cobalt, diamonds, and gold can be flown out of the country.

Shaba Province, the site of most of the country's mining activity, historically consumed almost 50% of the nation's generated electrical power. A portion of the electricity used in the Shaba region was delivered by the 1,800-km long, 560-megawatt Inga-Shaba transmission line, which runs from the Inga Dam on the Congo River south of Kinshasa to the Copperbelt city of Kolwezi in Shaba Province. Nevertheless, the tremendous hydroelectric potential of the Congo River remains largely untapped. Gecamines was also dependent on imported coke and refined petroleum products for its mine and metallurgical operations.

The short-term economic prospects for Zaire were poor and were further threatened by refugee problems and fighting in eastern Zaire. The recent decline of copper and cobalt production had led to the deterioration of the country's most important company, Gecamines. Despite predictions of Gecamines operations coming to a grinding halt owing to its multitude of problems, the company continued to operate, albeit at limited capacity. Changing Government policies promoting privatization of the state-run mining sector to attract new foreign capital and technical expertise holds some hope for the future. Because of its size and wealth of resources Zaire's long-term potential was more promising, and the country could remain an important supplier of copper, cobalt, and diamond for years. Much of Zaire's future mineral output will hinge on the availability of financing. Zaire's prospects depend on its ability to achieve political and economic stability, mobilize its

resources, control Government spending, and attract new foreign investment.

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Major Sources of Information

Ministere des Mines
3eme Niveau, Building Gecamines
Boulevard du 30 Juin
Kinshasa/Gombe,
Republique Democratique du Congo
Telecel: (243)-(12)-42-816, 42-817, or 42-818
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TABLE 1
ZAIRE: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

| Commodity | 1992 | 1993 | 1994 | 1995 | 1996 |
|---|-----------|-----------|-----------|-----------|-----------|
| METALS | | | | | |
| Cadmium, smelter | 84 | 12 | -- | -- | -- |
| Cobalt: | | | | | |
| Mine output, Co content | 5,700 | 2,459 | 826 | 1,674 | 2,000 e/ |
| Metal, Co content: | | | | | |
| Refinery (salable products) | 5,049 | 831 | 2,329 | 3,441 | 4,200 e/ |
| White alloy, matte | 1,580 | 1,267 | 945 | 546 | 546 e/ |
| Columbium and tantalum: | | | | | |
| Columbite-tantalite concentrate: | | | | | |
| Gross weight kilograms | 29,000 | 20,000 e/ | 4,120 | -- | -- |
| Cb content e/ do. | 7,500 | 5,000 | 1,000 | -- | -- |
| Ta content e/ do. | 8,000 | 5,700 | 1,000 | -- | -- |
| Pyrochlore concentrate: e/ | | | | | |
| Gross weight do. | 780,000 | 780,000 | -- | -- | -- |
| Cb content do. | 350,000 | 350,000 | -- | -- | -- |
| Copper: 2/ | | | | | |
| Mine output: | | | | | |
| By concentration or cementation | 25,100 | 6,900 | 7,200 | 6,800 | 6,200 |
| Leaching (electrowon) | 119,400 | 39,400 | 22,800 | 22,600 | 22,600 |
| Total | 144,500 | 46,300 | 30,000 | 29,400 | 28,800 |
| Metal: | | | | | |
| Smelter, primary: | | | | | |
| Electrowon (low grade) | 110,200 | 37,100 | 22,800 | 22,600 | 22,600 |
| Other | 23,200 | 5,700 | 7,200 | 6,200 | 6,000 |
| Total | 133,400 | 42,800 | 30,000 | 28,800 | 28,600 |
| Refinery, primary: | | | | | |
| Electrowon | 9,600 | 2,300 | -- | -- | -- |
| Other | 47,600 | 34,100 | 29,000 | 33,000 | 28,000 |
| Total | 57,200 | 36,400 | 29,000 | 33,000 | 28,000 |
| Gold e/ kilograms | 9,000 | 8,700 | 11,100 | 10,000 | 8,200 |
| Silver e/ do. | 29,500 | 11,000 | 900 | 900 | 900 |
| Thorium, monazite concentrate, gross weight e/ (55% rare-earth oxides) | 50 | 20 | -- | -- | -- |
| Tin: | | | | | |
| Mine output, Sn content | 1,020 | 700 e/ | 1,000 | 650 | 500 e/ |
| Smelter, primary e/ | 50 | 50 | 50 | -- | -- |
| Zinc: | | | | | |
| Mine output, Zn content | 22,300 | 6,830 | 100 | -- | -- |
| Metal, primary, electrolytic | 18,800 | 4,150 | -- | -- | -- |
| INDUSTRIAL MINERALS | | | | | |
| Cement, hydraulic | 174,000 | 149,000 | 50,000 e/ | 25,000 e/ | 10,000 e/ |
| Diamond: e/ | | | | | |
| Gem thousand carats | 8,930 3/ | 2,000 | 3,000 | 4,000 | 3,000 |
| Industrial do. | 4,570 3/ | 13,600 | 13,300 | 13,000 | 17,600 |
| Total do. | 13,500 3/ | 15,600 3/ | 16,300 | 17,000 | 20,600 |
| Lime e/ | 64,600 3/ | 50,000 | 50,000 | 50,000 | 50,000 |
| Stone, crushed e/ | 280,000 | 200,000 | 200,000 | 200,000 | 200,000 |
| Sulfur: | | | | | |
| S content of sulfuric acid from sphalerite e/ | 11,000 | 2,000 | -- | -- | -- |
| Sulfuric acid, gross weight: | | | | | |
| From sphalerite | 33,200 | 6,000 e/ | -- | -- | -- |
| From imported sulfur | 36,300 | 10,000 e/ | 15,000 e/ | -- | -- |
| Total | 69,400 | 16,000 e/ | 15,000 | -- | -- |
| MINERAL FUELS AND RELATED MATERIALS | | | | | |
| Coal, bituminous e/ | 61,000 | 14,000 3/ | 11,000 3/ | 10,000 | 10,000 |
| Petroleum: | | | | | |
| Crude thousand 42-gallon barrels | 8,687 | 8,285 | 9,125 | 10,220 | 10,000 e/ |
| Refinery products: | | | | | |
| Liquefied petroleum gas e/ do. | 3 3/ | 5 | 5 | 5 | 1 |
| Gasoline do. | 201 | 365 | 365 | 365 e/ | 89 e/ |
| Kerosene and jet fuel do. | 199 | 545 | 545 | 545 e/ | 135 e/ |
| Distillate fuel oil do. | 317 | 365 | 365 | 365 e/ | 90 e/ |
| Residual fuel oil do. | 193 | 1,095 | 1,095 | 1,095 e/ | 280 e/ |
| Refinery fuel and losses do. | 56 | 180 | 545 4/ | 545 e/ 4/ | 135 e/ 4/ |
| Total do. | 969 | 2,000 | 2,920 | 2,920 e/ | 730 e/ |

e/ Estimated. r/ Revised.

1/ Table includes data available through June 21, 1997.

2/ Terms are used as defined by the International Copper Study Group.

3/ Reported figure.

4/ Includes "Other."